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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/572,775	06/29/2006	Bogdan Vuletic	P/3240-110	9439
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EXAMINER LAZORCIC, JASON L				
ART UNIT 1791		PAPER NUMBER		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary**Application No.**

10/572,775

Applicant(s)

VULETIC, BOGDAN

Examiner

JASON L. LAZORCIK

Art Unit

1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2008.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 12-25 is/are pending in the application.
4a) Of the above claim(s) 12-19 and 21-25 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1,2,4-11 and 20 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 21 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Claims 12-19, and 21-25 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on April 1, 2008.

Status of Claim

Claims 12-19, and 21-25 are withdrawn from consideration as being drawn to a non-elected invention.

Claim 3 is canceled.

Claims 1-2, 4-11, and 20 are pending for prosecution on the merits.

Claim Objections

1. Claim 20 is objected to because of the following informalities:

2. Claim 20 depends from cancelled Claim 3. Since all of the limitations of cancelled claim 3 have been incorporated into independent claim 1, claim 20 is construed to depend from independent claim 1 for purposes of examination.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-2, 4-11, and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. Claim 1 recites the limitation wherein residual gases are passed "in countercurrent through a hot slag channel" in line 12. It is not evident precisely what Applicant intends as the referential direction for "countercurrent" (e.g. countercurrent to what?). In view of the ambiguous nature of the instant limitation, the precise metes and bounds of the instant invention are rendered unclear and indefinite. For purposes of examination, the instant limitation is accorded the broadest reasonable interpretation.
6. Claim 1 recites the limitation "the slag granules" in line 5. There is insufficient antecedent basis for this limitation in the claim.
7. Claim 10 recites the limitation "the water which has been separated off in the dewatering installation" in line 3. There is insufficient antecedent basis for this limitation in the claim.
8. Claim 11 recites the limitation "the slag rate" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Art Unit: 1791

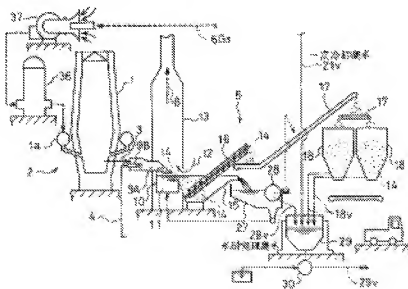
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1, 2, 4, 9, 10, 11, and 20 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kiyoshi (Japanese Patent publication number JP 08-245243).

11. Regarding independent **Claim 1** and with particular respect Kiyoshi figures 1, 2, and 3 (see particularly excerpt figures 1 and 2 below), Kiyoshi teaches a process for granulating slag from a blast furnace (2).

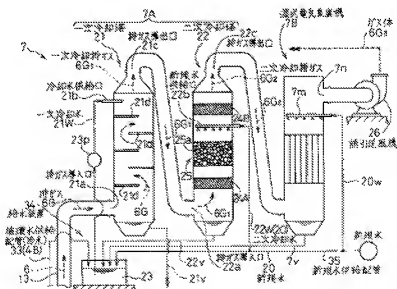
The reference specifically teaches feeding a granule/water mixture formed during granulation (9A, 9B) to a granulation tank (1) then to a dewatering installation (5) to dewater the slag granules.

【図2】



H₂S-containing vapors and gases (6G) formed during the granulation are at least partially condensed by water injected at a water injection point (21b) in the condensation space (13) which is flow connected to the granulation tank (10). Residual H₂S gases are discharged from the condensation space (13) below the water injection point (22a). The discharged gases (6G₃) are directed in "countercurrent" or recycled back to the slag blast furnace (2) wherein the gases are burned (¶[0070]) during formation of hot slag or "through a hot slag channel".

【圖 1】



Regarding **Claim 2**, the blast furnace (2) which is capable of supporting gaseous combustion process therein is construed to read upon the claimed combustion chamber.

Regarding **Claim 4**, the Kiyoshi process contacts the SO₂/H₂S contaminated steam vapors in a water scrubber column in an analogous manner to that disclosed in Applicants disclosed invention. Since Applicants disclosed water scrubber results in at least partial precipitation of the SO₂ vapors from the contaminated steam, the Kiyoshi process is likewise construed to result in at least partial precipitation of SO₂ from the H₂S containing vapors, absent compelling evidence to the contrary.

Regarding **Claims 9 and 11**, Kiyoshi teaches that the quantity of water injected into the condensation space is determined and controlled in order to maintain a desired temperature for the discharged residual gas (see ¶[0030]). Since the quantity of steam is dependent upon the rate at which slag is injected into the granulation tank, it follows that Kiyoshi either directly or indirectly controls the quantity of injected water as a function of the slag rate [**Claim 11**]. Further, where the gas temperature profile in the condensation space is directly linked to the pressure profile in the column, it is the Examiners assessment that Kiyoshi's process for controlling the amount of injected water directly results in the claimed control over "the quantity of vapor and gas passed into the condensation space by a sucking action" [**Claim 9**].

Regarding **Claim 10**, Kiyoshi teaches that condensate formed in the condensation space and water injected to the condensation space is discharged (21v) and fed to the water which has been separated off in the dewatering installation (29). Said water (29) is recirculated for granulation (4) and water injection (31).

Regarding **Claim 20**, Kiyoshi teaches that the hot blast stove 36 generates high temperature gas for combustion supplied to the blast furnace (see ¶[0069]). With

respect to the instant limitation, the noted combustion process is held substantially equivalent to the claimed ancillary flame.

Although Kiyoshi is silent regarding the conversion of H_2S to form SO_2 as recited in line 12 of claim 1, it is the Examiners assessment that such a chemical conversion is inherent or obvious over to the Kiyoshi process. That is Kiyoshi teaches recirculating residual H_2S gas back to the blast furnace wherein said recycled gas is admixed with makeup air ([0069]) and subjected to temperatures of about $1100^{\circ}C$ ([0070]) within the blast furnace (1). It is the Examiners understanding, absent compelling evidence to the contrary, that under such conditions at least a portion of the H_2S gas will be oxidized to form SO_2 gas.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. Claims 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kiyoshi (Japanese Patent publication number JP 08-245243).

As noted in the rejection above, Kiyoshi explicitly or inherently teaches nearly every limitation recited in Applicants claimed invention. With respect to **Claims 6 and 8**, Kiyoshi teaches drawing contaminated steam vapors produced in the granulation tank, through the condensation space (6), and discharging residual gases from the condensation by the induced draft fan (26) (§[0041]).

Regarding **Claim 6**, Kiyoshi is silent with respect to the recited limitation where "a superatmospheric pressure" is set in the granulation tank and in the condensation space below the water injection point". Similarly regarding **Claim 8**, Kiyoshi is silent regarding the recited limitation where "a subatmospheric pressure" is set "in the condensation space above the water injection point".

Having acknowledged the foregoing, it is evident that the Kiyoshi process requires a pressure drop from the granulation tank to the discharge point (26) in order to transport vapors in the disclosed fashion. Although the reference is silent regarding operating pressures relative to ambient pressure, it is reasonable to assume that the head space directly above the granulating tank, where large quantities of steam are generated during contact of hot slag with the tank water, would exhibit a nominally super atmospheric pressure. Similarly, where fan 26 operates to reduce relative pressure in the within the condensation space in order to provide flow of steam vapors through scrubber column, it would be reasonable to assume that the fan produces

nominally sub-atmospheric pressures at the discharge point under normal operating conditions.

Should Applicant assert that Kiyoshi does not inherently teach Applicants preferred operating pressures, then it is the Examiners position that one of ordinary skill in the art would reasonably have arrived at the claimed pressure profile through no more than routine experimentation and optimization of the prior art disclosed process. Specifically, absent evidence of substantially unexpected results, the determination of appropriate operating pressures for the Kiyoshi disclosed process would have fallen within the scope of routine process optimization for an engineer possessing no more than an ordinary level of skill in the art.

15. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kiyoshi (Japanese Patent publication number JP 08-245243) and Azuma et. al (US 2004/0237861 A1) further in view of Faber (US 5,540,895)

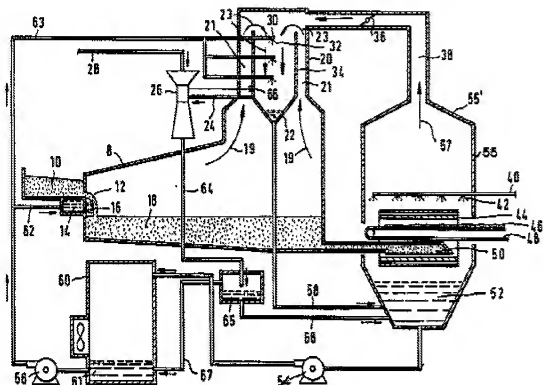
As noted in the rejection above, Kiyoshi teaches nearly every limitation recited in Applicants claimed invention. However, regarding claims 5, Kiyoshi is silent with respect to the claimed step of "partitioning off the granulation tank "in a gas tight manner from the dewatering installation". Similarly regarding claim 7, Kiyoshi is silent regarding the recited step of passing vapors and gases formed in the dewatering installation into the condensation space above the water injection point.

The United States patent to Faber (US 5,540,895) teaches a method for granulating slag with recovery of sulfur contaminated vapors. Specifically Faber teaches

feeding a granulated slag mixture to a granulation tank followed downstream by a dewatering apparatus. In the disclosed process, contaminated steam (19) generated during the granulation is at least partially condensed by injection of water from nozzles (30) in a condensation space. The reference further teaches that uncondensed gases are discharged below the water injection point (60) and recycled through the liquid scrubber system.

With respect to Claim 5, Faber teaches that the condensation tower (20) is closed at its lower end and separated from the dehydration or "dewatering installation" by a water barrier (Col. 4, lines 64-67). Faber teaches that such an arrangement "prevents the gases that are formed during the granulation process from being entrained towards the dehydration plant.

Similarly regarding Claim 7, Faber provides for a return conduit (38) from the dewatering installation back to the condensation tower (20) at a point above the water injection point for purification in the same manner as the contaminated steam originating from the granulation tank (Col. 6, lines 41-56). Such a vapor recovery insures more complete recovery of harmful H₂S and SO₂ gases from the granulation and dewatering facilities.



In view of the Faber disclosed process, it would have been obvious for one of ordinary skill in the art to modify the Kiyoshi disclosed apparatus to provide a gas tight water barrier between the granulation tank and the dewatering installation and to provide an analogous vapor recovery path (38) from the dewatering installation to the condensation tower. Such modifications would have been obvious to one of ordinary skill in the art seeking to provide increased recovery of harmful H_2S and SO_2 gases from the Kiyoshi slag granulation process.

The instant modifications constitute no more than application of known techniques (e.g. (A) a gas tight separation of granulation and dewatering installations by a water barrier and (B) the recovery and recycling of vapor from the dewatering

installation) to the analogous Kiyoshi slag granulation process in the same manner. Where both of the above noted techniques have been successfully demonstrated to reduce sulfur emissions in the Faber slag granulation process, one of ordinary skill in the art, upon application of the noted modifications, would reasonably expect an analogous enhanced recovery of sulfur contaminated gases in the Kiyoshi process.

Response to Arguments

16. Applicant's arguments, see pages 9-10, filed October 14, 2008, with respect to the rejection(s) of claim(s) under 35 U.S.C. §103(a) in view of Geropp, Schingnitz, and Watson have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection have been made in view of Kiyoshi (Japanese Patent publication number JP 08-245243) and Faber (US 5,540,895) as set forth above.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

18. Azuma (US 2004/0237861) teaches a closely related slag combustion furnace for forming slag from municipal or industrial waste and quenching said slag for form a granulated product. With particular respect to the embodiment of figure 16, Azuma teaches the claimed granulation and dewatering steps and the reference further teaches a general de-dusting operation (41) and a tertiary combustion chamber for burning H₂S

contaminant gas. Gases are directed or discharged into the tertiary combustion chamber (13) in a countercurrent direction to slag flow through primary and secondary combustion chambers (11 and 12).

Osborne (US 3,738,820) teaches a method for granulating slag comprising a granulating and dewatering steps and further comprising a condensing column for scrubbing sulfur contaminated gases from the process. The reference teaches that after passing through the gas washer (21) the process air is discharged from the fan (24) to the atmosphere.

Spencer (US 5,082,483) teaches a method and apparatus for granulating slag. Sulfur contaminated steam produced by the granulation process is passed through a condensing scrubber tower (50) and non-condensed gasses are passed through a chimney (60) to atmosphere or passed on to a gas scrubber (62) for further scrubbing.

Sharanov (US 3,912,487) teaches a method for granulating slag by feeding molten slag into a granulating tank and eventually to a dewatering installation. Sulfur contaminated steam generated by the quenching operation is directed through scrubber column (20) wherein the gas is contacted with water injected from collector (21). Scrubber purified air is passed directly to the atmosphere through pipe (22) (col. 6, lines 13-16).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON L. LAZORCIK whose telephone number is (571)272-2217. The examiner can normally be reached on Monday through Friday 8:30 am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jason L Lazorcik/
Examiner, Art Unit 1791